ORIGINAL ARTICLE

Our Experience with Tension-Free Urethral Reconstruction with Urethral Plate Dorsal Slit Technique

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Abstract

Background: Hypospadias is among the most common urogenital anomaly which is usually corrected by various surgical techniques. The global burden of hypospadias is shared among adult and pediatric urologists and plastic surgeons as well. Potential complications of the repair include meatal stenosis, urethrocutaneous fistula, urethral stricture, and urethral diverticulum. Fistula rates in large hypospadias series have been reported to range from 2% to 14% in Snodgrass repairs.

Objective: Our aim of this study is to identify the effectiveness of the dorsal urethral plate slit technique for tension-free hypospadias repair.

Material and Methods: A retrospective review was performed. A total of 53 patients presented to the plastic surgery outpatient department of Liaquat National Hospital within 2 years from January 2019 – December 2020 with congenital hypospadias, out of these 14 patients were included in the study who met the inclusion criteria. None of the patients had any prior hypospadias correction. The surgical technique involved the dorsal slit technique for tension-free repair. The patients were followed post-operatively for a total duration of 2 years to assess for any post-operative complications.

Result: The mean age of patients was 11±2.1 years, with the most common preoperative complaints of abnormal urinary stream. In all operated cases we observed a 7.1% rate of fistula formation. None of the subject patients developed meatal stenosis and only 1 patient developed a fistula during the study period. All other patients reported a good urinary stream and had an acceptable cosmesis postoperatively.

Conclusion: The urethral plate dorsal slit technique for tension-free hypospadias repair has a good outcome with relatively fewer complications and a high success rate. This modification along with careful preoperative planning during patient selection plays a key role in the outcome of the repairs.

Keywords: *Dorsal slit, hypospadias, tension-free, urethral reconstruction, urethral fistula.*

INTRODUCTION

Hypospadias is amongst the common urological anomaly with a ratio of around 3 in 1000 live births. It occurs usually due to the halt during the formation of the tubercle of the genitalia [1]. Often identified as a triangular defect, and reaching up to the region where the corpus spongiosum divides, the two pillars of atretic spongiosum represent the sides, whereby the glans is the base.

Surgical intervention for hypospadias consists of various techniques. The outcome usually depends on the type of hypospadias along with the surgical technique applied with the expertise, which ultimately defines the functional and cosmetic results.

Snodgrass urethroplasty for distal hypospadias is a common procedure and is accepted worldwide [2]. The modified Snodgrass is the tubularized incised plate (TIP) urethroplasty usually done for hypospadias repair and is well known for the repair of both hypospadias including the distal and proximal origins. In 1994 the procedure was described by Snodgrass and it has a reliable outcome, usually effective for the majority of patients along with a good aesthetic result, with lower complications.

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The advantage of the technique is the tension-free repair and formation of a neomeatus which is slit-like with an acceptable caliber [3]. Known complications of the procedure include meatal stenosis, fistula, urethral stricture, and urethral diverticulum [4]. The complication resulting in reoperation for Snodgrass repairs previously documented were for distal hypospadias only 5% and around 20% - 30% for varying types of severe hypospadias [5]. Post-operative fistula formation is amongst the most common complication seen after hypospadias correction [6]. The evidence suggests nearly 2% to 14% fistula formation in previous hypospadias repairs done by Snodgrass method [7].

Various other methods for reduction in fistula formation have been done either by the use of vascularized flaps or with coverage by the surrounding tissues during the primary urethroplasty [8]. The modified Snodgrass procedure introduced by Snodgrass in which tension-free urethroplasty was done with an additional manouver [9]. That is before the tubularization of the urethral plate over a stent (tube/catheter) the urethral plate was slitted dorsally with an incision extending from the native abnormal urethral meatus to the new proposed meatus at the glans tip [10].

Our aim of the study is to identify whether the dorsal slit in hypospadias can provide a tension-free hypospadias correction.

Fig. (1): (A) showing dorsal slit incision, and **(B)** showing post-operative results.

METHOD

A retrospective review was performed. Total of 53 patients presented to the plastic surgery outpatient department of Liaquat National Hospital within 2 years from January 2019 – December 2020 with congenital hypospadias, out of these 53 patients 42 had surgery. 11 patients were advised to undergo surgical procedure but they either refused surgical procedure or were lost to follow up. Of the operated 42 patients 28 patients had urethral reconstruction using techniques other than modified Snodgrass repair. 14 patients were included in this study who had urethral reconstruction by surgical technique "modified Snodgrass with a dorsal urethral slit for tension-free repair". None of the patients included in this study had any prior hypospadias correction. Patients were followed post-operatively with a total duration of 2 years to assess for any post-operative complications. The follow-up schedule was twice weekly for 2 weeks followed by fortnightly checks for 6 months, and then 6 monthly till the completion of 2 years.

Surgical Steps

The procedure starts with marking the U-shaped incision with its vertical limbs at the border of the urethral plate bilaterally and going down around the abnormally located meatus passing proximal to it. A circumscribing subcoronal incision a few millimeters below the corona is given for degloving of the penis. Tourniquet is applied, and Horton's test is performed. The catheter/stent is then passed. Dorsal urethral plate slitting is performed to expand the width of the urethral plate for tension closure. The incision extends from the native abnormal urethral meatus to the new proposed meatus at the glans tip. The depth of the incision is kept to the extent that half of the circumference of the tube sinks in it. Three-layered closure is done. The repair was kept tension free to allow the catheter/stent to glide freely. Hemostasis is done followed by glanuloplasty and skin closure. The aseptic dressing is then done (**Fig. 1**). Data was analyzed using SPSS version 24. Frequencies and percentages were computed for categorical variables. Mean ± standard deviation was computed to summarize age.

RESULTS

During 2 years of study duration, 14 patients were managed with a modified Snodgrass procedure with a dorsal urethral slit for tension-free urethral reconstruction. The mean age of patients was 11±2.1 years, based on the age they were divided into 4 groups; 0-5 years including 3 patients, 6-10 years including 3 patients, 11-15 years including 5 patients, and 16-20 years had 3 patients. All these patients presented with complaints of abnormal urinary stream (n = 14, 100%). Majority of the patients *i.e.*, 85.7% had distal hypospadias, and 14.2% had glanular type of hypospadias. There were no dropouts from the study.

During the mentioned study period none of the patients developed any complication except fistula formation which was seen in only 1 (7.1%) patient. The time for fistula formation was on the 18th day. The remaining (92.9%) patients had an unremarkable recovery and

Table 1: Shows age, type of hypospadias, and complications.

Patient No.	Type of Hypospadias	Age (in years) at Reconstruction	Fistula Formation	Meatal Stenosis	Other Complications
1	Distal Penile	3	No	No	No
2	Distal Penile	5	No	No	No
3	Distal Penile	6	No	No	No
4	Distal Penile	7	No	No	No
5	Distal Penile	10	No	No	No
6	Distal Penile	20	No	No	No
7	Glanular	11	No	No	No
8	Glanular	12	No	No	No
9	Distal Penile	4	Yes	No	No
10	Distal Penile	20	No	No	No
11	Distal Penile	18	No	No	No
12	Distal Penile	13	No	No	No
13	Distal Penile	12	No	No	No
14	Distal Penile	13	No	No	No

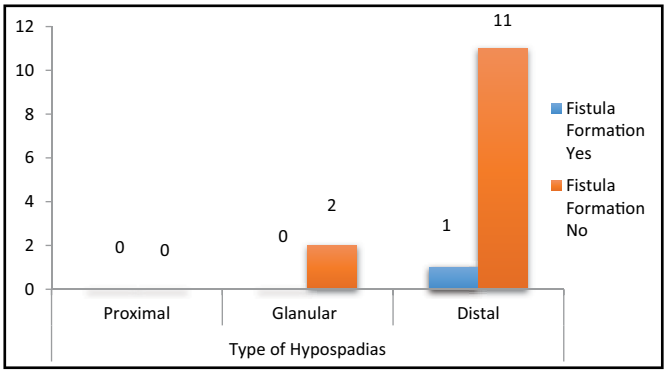

Fig. (2): Relationship between type of hypospadias and fistula formation.

had an acceptable cosmesis postoperatively. **Table 1** depicts the frequency of fistula formation among types of hypospadias (**Fig. 2**).

DISCUSSION

Modified snodgrass *i.e.*, tubularized incised plate (TIP) urethroplasty is a recognized technique for repairing distal and mid penile hypospadias. It is first described by Snodgrass in 1994 [11]. Chen *et al.* described the success rate for this technique for proximal penile hypospadias as 84% with a 16% fistula rate [12]. Snodgrass explained that limited incision up to the urethral plate, creates a wider meatus thus preventing scarring which is seen usually over the glans [13]. It is also documented that since the distal urethral spongiosum and glans are highly vascularised tissue and giving an incision directly results in the release of epithelial growth factor which stimulates repair of tissue and healing [14].

The urethral plate is supplied by well-vascularised tissue by named vessels including the deep dorsal artery and urethral arteries that supply the glans as well as corpus spongiosum, respectively [15]. The plate is precisely cut along the midline, which increases the urethral plate's width and results in tension-free closure. This technique does not interfere with the vascularity of the urethral plate and prevents scar formation on the neourethra [16].

This technique is useful in previously circumcised male patients with deficient foreskin or in redo surgeries which makes it the best option. This provides exceptional functional and aesthetic outcomes with decreased fistula rate [17]. Multiple techniques are defined for repairing hypospadias [18]. This technique provides adequate, supple, and well-vascularised local tissue which reduces the chances of fistula.

The urethral plate should be deeply cut towards the underlying corpus cavernous to prevent stenosis and dehiscence [19, 20]. Our study showed fistula rate of 7% is similar to that of others. There is no requirement for additional skin flaps for penile coverage; as the skin on the ventral surface is adequate.

Our study limitation includes a single-center retrospective study with a limited number of patients. There was no comparative group.

CONCLUSION

In our experience, the dorsal urethral slit technique in hypospadias correction can effectively eradicate the tension during the urethral tubularization which further decreases the rates of complications such as fistula formation.

ETHICAL APPROVAL

Ethical approval was obtained from the Institutional Review Committee of Liaquat National Hospital, Karachi (Ref: App # 0805-2022 LNH - ERC). All procedures performed in studies involving human participants were following the ethical standards of the institutional and/or national research committee and with the Helsinki Declaration.

CONSENT FOR PUBLICATION

Written consent was taken from all the study participants.

AVAILABILITY OF DATA

The data set may be acquired from the corresponding author upon a reasonable request.

FUNDING

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CONFLICT OF INTEREST

No conflict of interest.

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AUTHOR'S CONTRIBUTION

All the authors contributed equally to the publication of this article.

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